

WHAT IS CLAIMED IS:

1. An optical information recording method for recording information onto an optical information recording medium, the method comprising:

5 an identification step of identifying an information recording condition or information recording characteristics of the optical information recording medium; and

a recording pulse correction step of correcting a recording pulse position, in order to form a recording mark in a predetermined position;

10 wherein in the recording pulse correction step, correction accuracy of the recording pulse position is changed depending on the information recording conditions or the information recording characteristics that were identified in the identification step.

15 2. The optical information recording method according to claim 1, wherein an optical information recording medium that has two or more information layers is used as the optical information recording medium,

the method further comprising:

20 before the identification step, an information layer specification step of specifying an information layer on which the information is to be recorded in the optical information recording medium;

wherein in the identification step, information recording conditions or information recording characteristics of the information layer that is specified by the information layer specification step are identified; and

25 wherein in the recording pulse correction step, the correction accuracy of a recording pulse position in order to record the information on the information layer that is specified in the information layer specification step is differentiated according to the information recording conditions or information recording characteristics that are identified in the identification step.

3. The optical information recording method according to claim 1 or claim 2,

35 wherein an optical information medium that has a test recording region is used as the optical information recording medium;

the method further comprising:

a test recording step of recording a pattern for test recording in the test recording region, using the recording pulse that was corrected in the recording pulse correction step; and

5 a correction amount determination step of reproducing the pattern for test recording from the test recording region, and determining the correction amount of the recording pulse position from the reproduction result.

10 4. The optical information recording method according to claim 3, wherein when the recording accuracy is lowest, the test recording step and the correction amount determination step are omitted without correcting the recording pulse position.

15 5. The optical information recording method according to any one of claims 1 to 4,

wherein an optical information recording medium that contains a control track region is used as the optical information recording medium, the identification step further comprising:

20 an identifier detection step of reproducing information from the control track region, and detecting an identifier that represents the information recording conditions or information recording characteristics of the optical information recording medium, from the information that is reproduced;

25 wherein in the recording pulse correction step, the correction accuracy of the recording pulse position is differentiated according to the information recording conditions or information recording characteristics that are represented by the identifier detected in the identifier detection step.

30 6. The optical information recording method according to claim 5; wherein the identifier that is detected in the identifier detection step is an identifier that represents a recording density of the optical information recording medium.

35 7. The optical information recording method according to claim 5; wherein the identifier that is detected in the identifier detection step is an identifier that represents the favorability of the recording and

reproduction characteristics of the optical information recording medium.

8. The optical information recording method according to claim 7;
wherein the favorability of the recording and reproduction
5 characteristics is based on the favorability of a jitter or a bit error rate, or the
favorability of repeated recording and reproduction characteristics.

9. The optical information recording method according to claim 5;
wherein the identifier that is detected in the identifier detection step
10 is an identifier that represents a linear recording velocity of the optical
information recording medium.

10. The optical information recording method according to claim 1 or 2,
wherein an optical information recording medium that contains a
15 test recording region is used as the optical information recording medium;
the identification step further comprising:
a test recording step of recording a test recording pattern onto the
test recording region; and
a characteristic assessment step of reproducing the test recording
20 pattern from the test recording region and of assessing the information
recording characteristics of the optical information recording medium by
measuring the jitter or the bit error rate of the reproduction signal;
wherein in the recording pulse correction step, the correction
accuracy of the recording pulse position is differentiated according to the
25 information recording characteristics that are assessed in the characteristic
assessment step.

11. The optical information recording method according to claim 10,
wherein the correction accuracy in the recording pulse correction step
30 is increased when the jitter or the bit error rate that is measured in the
characteristic assessment has at least a predetermined value.

12. The optical information recording method according to claim 10,
wherein the correction accuracy in the recording pulse correction step
35 is decreased when the jitter or the bit error rate that is measured in the
characteristic assessment step has at most a predetermined value.

13. The optical information recording method according to any one of claims 10 to 12;

wherein a random pattern is used as the pattern for test recording.

5 14. The optical information recording method according to any one of the claims 10 to 13, the method further comprising:

a second test recording step of using the recording pulse that is corrected by the recording pulse correction step to record a second test recording pattern in the test recording region; and

10 a correction amount determination step of reproducing the second pattern for test recording from the test recording region and of determining the correction amount of the recording pulse position depending on the reproduction result.

15 15. The optical information recording method according to any one of claims 1 to 14;

wherein in the recording pulse correction step, the recording pulse position is corrected using a correction table in which a correction amount of the recording pulse position is prescribed according to the correction
20 accuracy.

16. The optical information recording method according to claim 15,
wherein in the recording pulse correction step, a correction table is used in which the number of elements that prescribe the correction amount
25 of the recording pulse position is greater when the correction accuracy is high than when the correction accuracy is low.

17. The optical information recording method according to claim 16,
wherein in the recording pulse correction step, the number of
30 elements in the correction table is substantially reduced when the recording accuracy is low, by setting the correction amount that is prescribed by a predetermined number of elements from among the plurality of elements contained in the correction table when the correction accuracy is high to be mutually equivalent.

35 18. The optical information recording method according to claim 15, the method further comprising:

a step of generating the correction table by setting the value of the elements in accordance with the correction accuracy from the number of table elements and the correction resolution that are determined in advance.

- 5 19. The optical information recording method according to claim 15,
wherein in the recording pulse correction step, one of the plurality of
correction tables whose number of elements is mutually different, and which
is determined in advance according to the correction accuracy, is selected and
used.
- 10 20. The optical information recording method according to claim 19,
wherein the plurality of correction tables that have different
numbers of elements comprise:
at least two selected from:
- 15 (a) a correction table that prescribes uniform values that do not
depend on the recording code length as the correction amount;
(b) a correction table that prescribes values that depend on the
recording code length as the correction amount;
(c) a correction table that prescribes values that depend on a
20 combination of the recording code length and the pre-code length and on a
combination of the recording code length and the post-code length;
21. The optical information recording method according to claim 15,
wherein in the recording pulse correction step, a correction table is
25 used in which the correction resolution of the recording pulse position is
higher when the correction accuracy is high than when the correction
accuracy is low.
22. The optical information recording method according to claim 21,
30 wherein in the recording pulse correction step, a correction table is
used in which the correction resolution that is prescribed is lowered by
culling a step of setting the value of the elements of the correction table when
the correction accuracy is low.
- 35 23. The optical information recording method according to any one of the
claims 1 to 22,
wherein a process of recording onto the optical information recording

medium is a mark edge recording process.

24. The optical information recording method according to any one of the claims 1 to 22,

5 wherein a process of recording onto the optical information recording medium is a mark position recording process.

25. The optical information recording method according to any one of claims 1 to 24,

10 wherein in the recording pulse correction step, the recording pulse position is corrected by changing a forward edge position of a front end pulse and a rear edge position of a back end pulse.

26. The optical information recording method according to any one of claims 1 to 24,

15 wherein in the recording pulse correction step, the recording pulse position is corrected by changing the actual position of a front end pulse and a back end pulse.

20 27. An optical information recording apparatus that records information onto an optical information recording medium, comprising:

identification means for identifying information recording conditions or information recording characteristics of the optical information recording medium; and

25 recording pulse correction means for correcting a recording pulse position, in order to form a recording mark in a predetermined position,

wherein the recording pulse correction means differentiates the correction accuracy of the recording pulse position according to the information recording conditions or the information recording characteristics that are identified by the identification means.

28. The optical information recording apparatus according to claim 27,

35 wherein an optical information recording medium that has two or more information layers is used as the optical information recording medium,

the apparatus further comprising:

information layer specification means for specifying the information

layer in the optical information recording medium on which information is to be recorded;

5 wherein the identification means identifies information recording conditions or information recording characteristics of the information layer that is specified by the information layer specification means; and

10 wherein the recording pulse correction means differentiates the correction accuracy of the recording pulse position in order to record information into the information layer that is specified by the information layer specification step, according to the information recording conditions or information recording characteristics that are identified by the identification means.

29. The optical information recording apparatus according to claim 27 or 28,

15 wherein an optical information medium that has a test recording region is used as the optical information recording medium;

the apparatus further comprising:

20 test recording means for recording a test recording pattern in the test recording region, using the recording pulse that was corrected by the recording pulse correction means; and

correction amount determination means for reproducing the pattern for test recording from the test recording region, and for determining the correction amount of the recording pulse position depending on the reproduction result.

25

30. The optical information recording apparatus according to claim 29,

30 wherein when the recording accuracy is lowest, determination of the correction amount by the test recording means and the correction amount determination means is omitted without correcting the recording pulse position.

31. The optical information recording apparatus according to any one of claims 27 to 30,

35 wherein an optical information recording medium that contains a control track region is used as the optical information recording medium;

the identification means further comprising:

identifier detection means for reproducing information from the

control track region, and for detecting an identifier that represents the information recording conditions or information recording characteristics of the optical information recording medium, from the information that is reproduced;

5 wherein the recording pulse correction means differentiates the correction accuracy of the recording pulse position depending on the information recording conditions or information recording characteristics that are represented by the identifier detected by the identifier detection means.

10 32. The optical information recording apparatus according to claim 31, wherein the identifier that is detected by the identifier detection means is an identifier that represents a recording density of the optical information recording medium.

15 33. The optical information recording apparatus according to claim 31, wherein the identifier that is detected by the identifier detection means is an identifier that represents the favorability of the recording and reproduction characteristics of the optical information recording medium.

20 34. The optical information recording apparatus according to claim 33, wherein the favorability of the recording and reproduction characteristics is based on the favorability of a jitter or a bit error rate, or the favorability of repeated recording and reproduction characteristics.

25 35. The optical information recording apparatus according to claim 31, wherein the identifier that is detected by the identifier detection means is an identifier that represents a linear recording velocity of the optical information recording medium.

30 36. The optical information recording apparatus according to claim 27 or 28,

 wherein an optical information recording medium that contains a test recording region is used as the optical information recording medium;

35 the identification means further comprising:

 test recording means for recording a test recording pattern onto the test recording region; and

characteristic assessment means for reproducing the test recording pattern from the test recording region and for assessing the information recording characteristics of the optical information recording medium by measuring the jitter or the bit error rate of the reproduction signal;

5 wherein the recording pulse correction means differentiates the correction accuracy of the recording pulse position according to the information recording characteristics that are assessed by the characteristic assessment means.

10 37. The optical information recording apparatus according to claim 36, wherein the correction accuracy of the recording pulse correction means is increased when the jitter or the bit error rate that is measured by the characteristic assessment means has at least a predetermined value.

15 38. The optical information recording apparatus according to claim 36, wherein the correction accuracy of the recording pulse correction means is decreased when the jitter or the bit error rate that is measured by the characteristic assessment means has at most a predetermined value.

20 39. The optical information recording apparatus according to any one of claims 36 to 38, wherein a random pattern is used as the pattern for test recording.

25 40. The optical information recording apparatus according to any one of claims 36 to 39, further comprising:

second test recording means that uses the recording pulse that is corrected by the recording pulse correction means, for recording a second test recording pattern in the test recording region; and

30 correction amount determination means for reproducing the second test recording pattern from the test recording region and for determining the correction amount of the recording pulse position depending on the reproduction result.

35 41. The optical information recording apparatus according to any one of claims 27 to 40,

wherein the recording pulse correction means uses a correction table in which a correction amount of the recording pulse position is prescribed

according to the correction accuracy to correct the recording pulse position.

42. The optical information recording apparatus according to claim 41,
wherein the recording pulse correction means uses a correction table
5 in which the number of elements that prescribe the correction amount of the
recording pulse position is greater when the correction accuracy is high than
when the correction accuracy is low.

43. The optical information recording apparatus according to claim 42,
10 wherein the recording pulse correction means substantially reduces
the number of elements in the correction table when the recording accuracy
is low, by setting the correction amount that is prescribed by a
predetermined number of elements from among the plurality of elements
contained in the correction table when the correction accuracy is high to be
15 mutually equivalent.

44. The optical information recording apparatus according to claim 41,
the method further comprising:

means for generating the correction table by setting the value of the
20 elements in accordance with the correction accuracy from the number of
table elements and the correction resolution that are determined in advance.

45. The optical information recording apparatus according to claim 42,
wherein the recording pulse correction means selects and uses one of
25 the plurality of correction tables whose number of elements are mutually
different, and which is determined in advance according to the correction
accuracy.

46. The optical information recording apparatus according to claim 45,
30 wherein the plurality of correction tables that have different
numbers of elements comprise:

at least two selected from:

(a) a correction table that prescribes uniform values that do not
depend on the recording code length as the correction amount;

35 (b) a correction table that prescribes values that depend on the
recording code length as the correction amount;

(c) a correction table that prescribes values that depend on a

combination of the recording code length and the pre-code length and on a combination of the recording code length and the post-code length;

47. The optical information recording apparatus according to claim 41,
5 wherein in the recording pulse correction means, a correction table is used in which the correction resolution of the recording pulse position is higher when the correction accuracy is high than when the correction accuracy is low.

10 48. The optical information recording apparatus according to claim 47, wherein in the recording pulse correction means, a correction table is used in which the correction resolution that is prescribed is lowered by culling a step of setting the value of the elements of the correction table when the correction accuracy is low.

15 49. The optical information recording apparatus according to any one of the claims 27 to 48,
wherein a process of recording onto the optical information recording medium is a mark edge recording process.

20 50. The optical information recording apparatus according to any one of the claims 27 to 48,
wherein a process of recording onto the optical information recording medium is a mark position recording process.

25 51. The optical information recording apparatus according to any one of claims 27 to 50,
wherein in the recording pulse correction means, the recording pulse position is corrected by changing a forward edge position of a front end pulse
30 and a rear edge position of a back end pulse.

52. The optical information recording apparatus according to any one of claims 27 to 50,
wherein in the recording pulse correction means, the recording pulse
35 position is corrected by changing the actual position of a front end pulse and a back end pulse.

53. An optical information recording medium that records information,
wherein the optical information recording medium contains a
plurality of correction tables, whose correction accuracy is mutually different
and which correspond to a plurality of information recording conditions or
5 information recording characteristics.
54. The optical information recording medium according to claim 53,
wherein the correction tables are contained in a control track region.
- 10 55. The optical information recording medium according to claim 53,
wherein the information recording condition is the linear recording
velocity; and
wherein the optical information recording medium contains a
correction table whose correction resolution increases with increase in the
15 linear recording velocity.
56. The optical information recording medium according to claim 53,
wherein the information recording condition is the recording density;
and
20 wherein the optical information recording medium contains a
correction table whose correction resolution increases with increase in the
recording density.
57. The optical information recording medium according to claim 53,
25 wherein the optical information recording medium contains an
identifier that represents the correction accuracy of a recording pulse
position.
58. The optical information recording medium according to claim 57,
30 wherein the identifier is contained in the control track region.
59. The optical information recording medium according to claim 57,
wherein the optical information recording medium contains a
plurality of the identifiers that correspond to a plurality of information
35 recording conditions or information recording characteristics.